

What is claimed is:

1. A method of automated sample processing, comprising the steps of:  
providing at least one sample;  
5 determining a processing sequence for at least one sample;  
actively regulating temperature of said sample; and  
automatically processing said sample.
2. A method of automated sample processing as described in claim 1 wherein said  
10 step of actively regulating temperature comprises the step of reducing temperature  
of said sample.
3. A method of automated sample processing as described in claim 2 and further  
comprising the step of controlling a reduction in temperature.
- 15 4. A method of automated sample processing as described in claim 2 wherein said  
step of actively regulating temperature comprises the step of maintaining sample  
temperature at less than about ambient temperature of said sample processing  
system.
- 20 5. A method of automated sample processing as described in claim 1 wherein said  
step of corresponding to at least one temperature tolerance.
6. A method of automated sample processing as described in claim 1 wherein said  
25 step of actively regulating temperature of said sample comprises the step of  
actively regulating temperature of said sample to at least one tolerance.
7. A method of automated sample processing as described in claim 1 wherein said  
step of actively regulating temperature of said sample comprises the step of  
30 actively maintaining a temperature of about a sample set point.
8. A method of automated sample processing as described in claim 1 wherein said  
step of actively maintaining a temperature of about a sample set point comprises

the step of actively maintaining temperature within a range of about 1 degrees above and 1 degrees below said sample set point.

- 5 9. A method of automated sample processing as described in claim 1 wherein said step of actively regulating temperature of said sample comprises the step of regulating a ramped increase in temperature.
- 10 10. A method of automated sample processing as described in claim 1 wherein said step of actively regulating temperature of said sample comprises the step of regulating a ramped decrease in temperature.
- 15 11. A method of automated sample processing as described in claim 9 or 10 wherein said step of actively regulating temperature of said sample comprises the step of regulating a reduced rate of temperature change.
12. A method of automated sample processing as described in claim 1 and further comprising the step of regulating a temperature of a reagent.
- 20 13. A method of automated sample processing as described in claim 12 wherein said step of regulating a temperature of a reagent comprises the step of actively regulating a temperature of a reagent.
- 25 14. A method of automated sample processing as described in claim 13 wherein said step of actively regulating a temperature of a reagent comprises the step of optimizing reagent temperature at a thermal set point.
- 30 15. A method of automated sample processing as described in claim 14 wherein said step of optimizing reagent temperature at a thermal set point comprises the step of actively maintaining reagent temperature at less than about an ambient temperature of a sample processing system.
16. A method of automated sample processing as described in claim 13 wherein said step of actively regulating a temperature of a reagent comprises the step of maintaining reagent shelf life.

17. A method of automated sample processing as described in claim 1, 4, 12, 13, or 15 wherein said step of actively regulating temperature of said sample comprises the step of adaptively regulating temperature of said sample.
- 5 18. A method of automated sample processing as described in claim 17 wherein said step of adaptively regulating temperature of said sample comprises the step of adaptively regulating temperature corresponding to at least one sample carrier.
- 10 19. A method of automated sample processing as described in claim 1, 4, 13, 15, or 17 wherein said step of actively regulating temperature of said sample comprises the step of utilizing a Peltier device.
- 15 20. A method of automated sample processing as described in claim 17 wherein said step of adaptively regulating temperature of said sample comprises the step of regulating temperature with a Peltier grid.
- 20 21. A method of automated sample processing as described in claim 17 wherein said step of adaptively regulating temperature of said sample comprises the step of utilizing a conductive device.
- 25 22. A method of automated sample processing as described in claim 20 wherein said step of regulating temperature with a Peltier grid comprises the step of regulating temperature with a plurality of thermal elements each corresponding to a sample carrier support.
- 30 23. A method of automated sample processing as described in claim 17 wherein said step of adaptively regulating temperature of said sample comprises the step of adaptively decreasing temperature from ambient temperature to a target temperature, wherein said ambient temperature is greater than said target temperature.

24. A method of automated sample processing as described in claim 17 wherein said step of adaptively regulating temperature of said sample comprises the step of providing a controlled increase in temperature.
- 5 25. A method of automated sample processing as described in claim 17 wherein said step of adaptively regulating temperature of said sample comprises the step of decreasing temperature.
- 10 26. A method of automated sample processing as described in claim 25 wherein said step of adaptively regulating temperature of said sample comprises the step of providing a controlled decrease in temperature.
- 15 27. A method of automated sample processing as described in claim 26 wherein said step of adaptively regulating temperature of said sample comprises the steps of:  
determining at least one desired sample temperature; and  
decreasing temperature of said sample to said desired sample temperature.
- 20 28. A method of automated sample processing as described in claim 27 wherein said step of adaptively regulating temperature of said sample further comprises the steps of:  
determining a sample temperature tolerance; and  
maintaining said sample temperature within said sample temperature tolerance.
- 25 29. A method of automated sample processing as described in claim 27 wherein an ambient system temperature is above said temperature of said sample.
- 30 30. A method of automated sample processing as described in claim 1 or 18 wherein said step of actively regulating temperature of said sample comprises the step of reducing a rate of temperature change.
31. A method of automated sample processing as described in claim 1 or 18 wherein said step of actively regulating temperature of said sample comprises the step of

maintaining at least one temperature tolerance corresponding to at least one sample carrier.

32. A method of automated sample processing as described in claim 13 wherein said  
5 step of actively regulating a temperature of a reagent comprises the step of optimizing reagent temperature at a thermal set point.
33. A method of automated sample processing as described in claim 32 wherein said  
10 step of optimizing reagent temperature at a thermal set point comprises the step of maintaining reagent temperature at less than about ambient temperature of said sample processing system.
34. A method of automated sample processing as described in claim 13 wherein said  
15 step of actively regulating a temperature of a reagent comprises the step of maintaining reagent shelf life.
35. A method of automated sample processing as described in claim 19 wherein said  
20 step of actively regulating temperature of said sample comprises the step of maintaining a temperature of between about 2 and about 8 degrees Celsius.
36. A method of automated sample processing as described in claim 19 wherein said  
25 step of actively regulating temperature of said sample comprises the step of maintaining a temperature within a range of about 2 degrees above and 2 degrees below 24 degrees Celsius.
37. A method of automated sample processing as described in claim 1 wherein said  
step of providing at least one sample comprises the step of providing at least one batch of samples.
38. A method of automated sample processing as described in claim 1 and further  
30 comprising the step of determining at least one temperature tolerance for at least one component of said sample processing system.

39. , A method of automated sample processing as described in claim 38 wherein said step of determining at least one temperature tolerance for at least one component of said sample processing system comprises the step of determining at least one tolerance corresponding to at least one sample carrier.
- 5 40. A method of automated sample processing as described in claim 38, wherein said step of determining at least one tolerance for at least one component of said sample processing system comprises the step of determining at least one tolerance corresponding to at least one reagent.
- 10 41. A method of automated sample processing as described in claim 1 wherein said step of determining a processing sequence for at least one sample comprises the step of determining an immunohistochemistry processing sequence.
- 15 42. A method of automated sample processing as described in claim 1 wherein said step of determining a processing sequence for at least one sample comprises the step of determining an in-situ hybridization processing sequence.
- 20 43. A method of automated sample processing as described in claim 1 wherein said step of determining a processing sequence for at least one sample comprises the step of determining an fluorescent in-situ hybridization processing sequence.
- 25 44. A method of automated sample processing as described in claim 1 wherein said step of determining a processing sequence for at least one sample comprises the step of determining a microarray processing sequence.
- 30 45. A method of automated sample processing as described in claim 1 wherein said step of determining a processing sequence for at least one sample comprises the step of determining a target retrieval processing sequence.
46. A method of automated sample processing as described in claim 1 wherein said step of determining a processing sequence for at least one sample comprises the step of determining a sample staining processing sequence.

47. A method of automated sample processing as described in claim 17 wherein said step of adaptively regulating temperature of said sample comprises the step of adaptively reducing rates of temperature change.
- 5 48. An automated sample processing system comprising:  
at least one sample;  
an automated sample processing system; and  
a Peltier device to which said sample is responsive.
- 10 49. A automated sample processing system as described in claim 48 wherein said Peltier device comprises a plurality of heat pumps.
50. A automated sample processing system as described in claim 48 wherein said Peltier device comprises:  
15 a first heat sink  
a first fan configured to be interior of an interior volume of a sample processing system;  
a second heat sink; and  
a second fan configured to be exterior of an interior volume of a sample  
20 processing system.
51. A automated sample processing system as described in claim 48 wherein said Peltier device comprises at least one thermoelectric device.
- 25 52. A automated sample processing system as described in claim 51 wherein said at least one thermoelectric device comprises a plurality of electrical junctions configured to be within an enclosure of a sample processing system.
53. A automated sample processing system as described in claim 51 wherein said at  
30 least one thermoelectric device comprises a plurality of electrical junctions configured to be at a boundary of an interior volume of a sample processing system.

54. A automated sample processing system as described in claim 48 wherein said Peltier device is configured to reduce a temperature.
55. An automated sample processing system as described in claim 48 wherein said Peltier device comprises a Peltier grid.
56. An automated sample processing system as described in claim 55 and further comprising a carrier support to which said at least one sample is responsive and wherein said Peltier device comprises at least one temperature regulation element configured to said sample carrier support.
57. An automated sample processing system as described in claim 56 wherein said at least one temperature regulation element comprises a laminated thermal element.
58. An automated sample processing system as described in claim 56 wherein said at least one temperature regulation element comprises a cold plate.
59. A method of automated sample processing, comprising the steps of:  
providing at least one sample;  
providing at least one reagent;  
determining a processing sequence for at least one sample;  
regulating a temperature of said reagent; and  
automatically processing said sample.
60. A method of automated sample processing as described in claim 59 wherein said step of regulating a temperature of said reagent comprises the step of actively regulating reagent temperature.
61. A method of automated sample processing as described in claim 60 wherein said step of actively regulating reagent temperature comprises the step of optimizing reagent temperature at a thermal set point.
62. A method of automated sample processing as described in claim 61 wherein said step of optimizing reagent temperature at a thermal set point comprises the step of



maintaining reagent temperature at less than about ambient temperature of said sample processing system.

- 5 63. A method of automated sample processing as described in claim 62 wherein said step of actively regulating reagent temperature comprises the step of maintaining reagent shelf life.
64. An automated sample processing system comprising:  
at least one sample;  
10 at least one reagent;  
an automated sample processing system to which said sample is responsive; and  
a reagent temperature control element to which said reagent is responsive.
- 15 65. An automated sample processing system as described in claim 64 wherein said reagent temperature control element comprises a reagent temperature control element configured to reduce a temperature of said reagent.
- 20 66. An automated sample processing system as described in claim 64 wherein said reagent temperature control element comprises a reagent temperature control element configured to reduce a rate of temperature change.
- 25 67. An automated sample processing system as described in claim 64 wherein said reagent temperature control element comprises a reagent temperature control element configured to regulate temperature of a plurality of reagents.
68. An automated sample processing system as described in claim 64 wherein said reagent temperature control element comprises an adaptive temperature regulation element.
- 30 69. An automated sample processing system as described in claim 64 wherein said reagent temperature control element comprises a Peltier device.

70. An automated sample processing system as described in claim 69 wherein said Peltier device comprises at least one conductive regulation element.
71. An automated sample processing system as described in claim 70 wherein said at least one conductive regulation element comprises a conductive regulation element configurable with a reagent tray.
72. A reagent temperature regulation device as described in claim 69 wherein said Peltier device comprises at least one conductive regulation element.
73. A method of automated sample processing comprising the steps of:
- acquiring at least one temperature tolerance for at least one protocol;
  - transmitting said at least one temperature tolerance to at least one sample processing system;
  - adaptively processing at least one sample with said at least one sample processing system in accordance with said at least one temperature tolerance; and
  - acquiring sample processing information from said at least one sample processing system.
74. A method of automated sample processing as described in claim 73 wherein said step of acquiring sample processing information comprises the step of acquiring at least one processing temperature.
75. An automated sample processing system comprising:
- at least one sample;
  - an automated sample processing system to which said sample is responsive; and
  - an active temperature regulation element to which said sample is responsive.
76. An automated sample processing system as described in claim 75 wherein said active temperature regulation element to which said sample is responsive comprises a temperature reduction element.

77. An automated sample processing system as described in claim 76 wherein said temperature reduction element comprises a controlled active temperature reduction element.
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78. An automated sample processing system as described in claim 76 wherein said temperature reduction element maintains said sample at less than an ambient temperature.
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79. An automated sample processing system as described in claim 75 wherein said active temperature regulation element to which said sample is responsive comprises a temperature ramp up element.
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80. An automated sample processing system as described in claim 75 wherein said active temperature regulation element to which said sample is responsive comprises a temperature ramp down element.
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81. An automated sample processing system as described in claim 79 or 80 wherein said active temperature regulation element to which said sample is responsive comprises a reduced rate of temperature change element.
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82. An automated sample processing system as described in claim 75 and further comprising a reagent temperature control.
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83. An automated sample processing system as described in claim 75, 78, or 82 wherein said active temperature regulation element to which said sample is responsive comprises an adaptive temperature regulation element.
84. An automated sample processing system as described in claim 83 wherein said adaptive temperature regulation element comprises a carrier temperature regulation element.

85. An automated sample processing system as described in claim 75, 78, 82, or 83 wherein said active temperature regulation element to which said sample is responsive comprises a Peltier device.
- 5 86. An automated sample processing system as described in claim 75, 78, 82, or 83 wherein said active temperature regulation element to which said sample is responsive comprises a Peltier grid.
87. An automated sample processing system as described in claim 75, 78, 82, or 83 wherein said active temperature regulation element to which said sample is responsive comprises a conductive device.
- 10 88. An automated sample processing system as described in claim 75, 78, 82, or 83 wherein said active temperature regulation element comprises a plurality of thermal elements each corresponding to a sample carrier support.
- 15 89. An automated sample processing system as described in claim 75, 78, 82, or 83 wherein said sample comprises a batch of samples.
- 20 90. An automated sample processing system as described in claim 75, 78, 82, or 83 wherein said automated sample processing system comprises an automated immunohistochemistry processing system.
91. An automated sample processing system as described in claim 75, 78, 82, or 83 wherein said automated sample processing system comprises an automated in-situ hybridization processing system.
- 25 92. An automated sample processing system as described in claim 75, 78, 82, or 83 wherein said automated sample processing system comprises an automated fluorescent in-situ hybridization processing system.
- 30 93. An automated sample processing system as described in claim 75, 78, 82, or 83 wherein said automated sample processing system comprises an automated microarray processing system.

94. An automated sample processing system as described in claim 75, 78, 82, or 83 wherein said automated sample processing system comprises an automated target retrieval processing system.

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95. An automated sample processing system as described in claim 75, 78, 82, or 83 wherein said automated sample processing system comprises an automated stainer processing system.